



Remarks

I. Claim Rejections -- 35 USC §102(b). Claims 1, 2, 4, and 8 stand rejected under 35 U.S.C. 102(b) as being anticipated by *Sadeck* (4,623,109). This rejection is traversed. Claims 1 and 8 have been amended to emphasize the patentable differences.

The Fujiwara Parachute. The instant invention (the *Fujiwara* parachute) is a circular parachute having cascaded main suspension lines 12. Each main suspension line 12 is cascaded in the sense that it branches from a single lower segment into two upper segments. Each suspension line 12 has a single lower segment 12A that branches at a branch junction 12B into two upper segments 12C and 12D (paragraph 21.00).

The branch junctions of the main suspension lines are all separate from each other, allowing the lower segments to spread apart from each other during descent as depicted in the drawings. The two upper segments of each main suspension line (e.g., upper segments 12C and 12D) extend upwardly from the branch junction of that main suspension line (branch junction 12B) to the skirt band 13 of the canopy 11. The single lower segment of each main suspension line (e.g., lower segment 12A) extends downwardly from the branch junction to the suspension line junction 14. The branch junctions are spread apart from each other during descent, with the lower segments of the main suspension lines converging downwardly toward a main suspension line confluence at the suspension line junction 14.

The Sadeck Patent. The *Sadeck* patent, on the other hand, describes an annular ring parachute having conventional suspension lines 10 that do not branch in the manner of the *Fujiwara* parachute. There are four identical sets of the suspension lines 10. The

individual suspension lines 10 in each set converge downwardly to a suspension line confluence at a corresponding one of four riser links 14 (a common junction. Each suspension line 10 in each of the four sets has a first end that is connected to the skirt 3 of the canopy 2, and a second end that is attached to the corresponding one of the four riser links 14. Two risers 16 extend downwardly from each of the four riser links 14 to a load-bearing harness.

Differences. Thus, the *Fujiwara* parachute is much different from the parachute described in the *Sadeck* patent. The *Sadeck* risers 16 are not the equivalent of the *Fujiwara* lower suspension line segments 12A, nor are the *Sadeck* suspension lines 10 equivalent to the *Fujiwara* upper suspension line segments 12C and 12D. Multiple *Sadeck* risers are connected to each of the four *Sadeck* riser links 14, whereas only a single *Fujiwara* lower suspension line segment is connected to each *Fujiwara* branch junction 12B. In addition, eight conventional *Sadeck* suspension lines 10 are connected to multiple risers at each of the four riser links 14, whereas just two *Fujiwara* upper suspension line segments are connected to a single *Fujiwara* lower suspension line segment at the *Fujiwara* branch junctions 14B.

Significance. The *Fujiwara* parachute enables one to tailor the opening forces on a circular type parachute by increasing the downward force on a planner-reefing device. The additional force is generated by increasing the branching angle of the suspension lines above the planner reefing device and near the skirt of the parachute. The increased angle has been accomplished by cascading the suspension lines and adjusting the junction point to control the descent of the planner-reefing device. This increased force provides a controllable and repeatable method of deploying the planner-reefing device. Significant advantages of controlling the opening forces include an increase

in the maximum deployment speed, increased maximum recovery weight, increased range of deployment velocities, reduced system weight and reduced pack volume.

Much effort has been spent trying to reduce the opening forces of a circular parachute using a planner-reefing device with limited success. The introduction of high angle suspension lines near the skirt band of a circular parachute provides a new method to tailor the opening forces of a circular parachute using a planner-reefing device. The conventional *Sadeck* suspension lines arrangement does not significantly change the angle near the skirt band. Advantages to controlling the deployment of the planner-reefing device include an increased range of parachute deployment velocities. The opening forces on high-speed parachute deployments are significantly reduced while the opening distances on slow speed deployments remain unchanged.

In the past, cascaded suspension lines were for use on ram-air (gliding) and annular (airfoil) type parachutes. They were designed to reduce suspension line weight and pack volume as well as parasitic drag on the gliding parachutes. They did not include suspension lines of equal length or attached to the perimeter (skirt band) of a circular parachute.

Amended Claims. Currently amended independent claims 1 and 8 have been amended to emphasize the patentable differences outlined above, and the specification has been amended to reflect the claim terminology, no new matter being added thereby. As amended, currently amended claims 1 and 8 include the following limitations:

“wherein the main suspension lines include branch junctions such that each main suspension line includes a respective one of the branch junctions at which the lower main suspension line segment branches into the two upper main suspension line segments; and

“wherein the lower main suspension line segments converge downwardly to a suspension line junction.”

Nowhere does the *Sadeck* patent describe or suggest a parachute as specified in currently amended claims 1 and 8. In view of the foregoing, currently amended independent claims 1 and 8 are now allowable together with properly dependent claims 2 and 4, and notification to that effect is requested.

II. Claim Rejections -- 35 USC §103. Claims 5 and 6 stand rejected under 35 U.S.C. 103(a) as being unpatentable over *Sadeck* (4,623,109). Claims 5 and 6 are properly dependent upon currently amended claim 1, which is now allowable. Thus, claims 5 and 6 are now allowable and notification to that effect is requested.

Claims 7 and 9 stand rejected under 35 U.S.C. 103(a) as being unpatentable over *Sadeck* in view of *Case* (4,863,119). Claim 7 is properly dependent upon currently amended independent claim 1, which is now allowable, and claim 9 is properly dependent upon currently amended independent claim 8, which is now allowable. Thus, claims 7 and 9 are now allowable and notification to that effect is requested.

Claims 13 and 14 stand rejected under 35 U.S.C. 103(a) as being unpatentable over *Sadeck* (4,623,109). Currently amended independent claim 13 has been amended to emphasize the patentable differences by including the limitations discussed above that have been added to currently amended claims 1 and 8 so that claim 13 is now allowable together with properly dependent claim 14. Notification to that effect is requested.

III. Claims Objections. Claim 1 stands objected to because the word “ban” should be “band.” Appropriate correction has been made to currently amended independent claims 1, 8, and 13.

V. Reexamination and Allowance. In view of the foregoing, currently amended independent claims 1, 8, and 13 (independent) are now allowable together with previously amended claim 2 (properly dependent) and originally presented claims 4, 5, 6, 7, 9, and 14 (properly dependent). Notification to that effect is requested. Reexamination and allowance are requested.